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Commercial Forest Area and Timber Volume in California, 1963

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This report summarizes the findings of a re-inventory of California's forest resources. Field work for the inventory was completed in 1962, and data were compiled as of January 1, 1963.

The Forest Service, U. S. Department of Agriculture, conducts continuing surveys of the forest resources of the United States, to provide periodic estimates of the nation's timber resources for use in policy planning and program formulation. The forest survey is conducted on a regional basis by the experiment stations of the Forest Service. The Pacific Southwest Forest and Range Experiment Station was responsible for this survey in California.

The initial survey of California was completed in 1952, and its findings were reported in the publication "Forest Statistics for California."¹ Much of the information for 1963 has been published in "Timber Trends in the United States"²; it is consolidated here for the convenience of California planners.

Users of the data in this report are cautioned to read carefully the definitions of the terms used, and the statements pertaining to reliability of the estimates, given in the appendix.

Findings for 1963

California's forests support a multiplicity of uses. Their existence, in one way or another, affects every person in the State, and many persons in other parts of the country. This report, however, is primarily concerned with California's forests as a timber resource.

Commercial Forest Area

About 41 percent of California's forested area grows or could grow commercial crops of timber, and is not set aside for other uses. This 17.4-million-acre area is California's commercial forest land³ (table 1).⁴ The remainder of the forest land area--more than 25 million acres--consists of unproductive areas, where adverse site conditions preclude timber management, and of productive but reserved land in parks and wilderness areas.

Most of the commercial forest land lies in the northern half of the State, chiefly in the north coast and northern counties, and along the Sierra Nevada. Some is in scattered locations in the mountains of southern California.

¹U.S. Forest Serv. Calif. Forest & Range Exp. Sta. Forest Survey Rel. 25, 63 pp., illus. 1954.

²Forest Serv. U.S. Dep. Agr. Forest Resource Rep. 17, 235 pp., illus. 1965.

³See the appendix for definitions of terms used in this report.

⁴All tables in this report are included in the appendix.

Commercial Forest Land Ownership

In California, ownership of commercial forest land is almost equally divided between public agencies and private firms and individuals. Nearly 50 percent of the commercial forest land--8.6 million acres--is administered by the U. S. Forest Service. An additional 3 percent--0.6 million acres--is in other public ownerships. The remaining 47 percent--8.2 million acres--is in private holdings (table 2). Forest industries own 37 percent of the privately held commercial forest land.

Stand-Size Classes

Seventy-four percent of California's commercial forest land is stocked with sawtimber size stands of timber. Old-growth sawtimber stands, where 50 percent or more of the net live timber volume is in old-growth trees, occupy 8.7 million acres. These old-growth stands occupy half of the State's commercial forest area, and should continue to be important in California's timber supply outlook. Young-growth sawtimber stands occupy 4.1 million acres. Of the remaining acreage, 0.8 million acres are stocked with poletimber, seedlings, and saplings, and 3.8 million acres are classified as less than 10 percent stocked (table 3).

Stocking

Nearly a third of California's commercial forest land area is occupied by well stocked stands. About a third is medium stocked, and the remainder is either poorly stocked or nonstocked. Sawtimber stands account for 94 percent of the stocked stands, and pole stands make up most of the remaining 6 percent (table 4).

Major Forest Types

All pine types combined account for one-half of the State's commercial forest land area (table 5). And more than half of the pine type acreage is in public ownership. The most important pine types and their share of the commercial forest land are: ponderosa and Jeffrey pine, 35 percent; sugar pine, 13 percent.

Douglas-fir type, mostly in the northern coastal counties, occupies 25 percent of the commercial forest land--about equally divided between public and private ownerships. The true firs (fir-spruce type) occupy 16 percent of the State's commercial forest area--about two-thirds publicly owned, and one-third privately owned. The redwood type, occupying 9 percent of the State's commercial forest land total, is confined to a narrow belt that coincides with the fog belt along the northern California coastline. Most of it is privately owned.

Yield Classes

Yield classes are measures of the potential yield of a forest area in terms of cubic feet or wood per acre per year. One-third of the State's commercial forest land has a high yield potential. Only 4 percent of the

commercial forest area is incapable of yielding more than 50 cubic feet of wood per acre per year (table 6).

Timber Volume

In 1963, California's commercial forests held 304 billion board feet (International 1/4-inch log rule) of live merchantable sawtimber. This is the net volume of all merchantable softwoods and hardwoods, 11.0 inches and larger in diameter, regardless of current availability for use. This volume includes timber currently inaccessible or located in scattered patches each of at least 1 acre, timber now unmarketable because of size or species, and timber in areas where recreation or watershed considerations preclude harvest operations at the present time (table 8).

More than half (53 percent) of this volume is on National Forest lands, 43 percent on private lands, and the remaining 4 percent in other public ownerships.

Softwood species comprise 99.5 percent of the 304 billion board feet of sawtimber volume (table 8). One-third of the live sawtimber volume in California is Douglas-fir. True firs (white fir, California red fir, and grand fir) account for one-fourth of the total; ponderosa and Jeffrey pine, one-fifth; redwood, one-tenth (table 9).

Almost 40 percent of the total volume of standing sawtimber is in trees 39 inches or larger in diameter (table 10). This finding reflects the large amount of old-growth sawtimber that remains in California. Only 10 percent of the volume is small sawtimber (11.0 to 18.9 inches in diameter).

Growth and Mortality

For the decade 1953-62, average annual net growth on California's 17.4 million acres of commercial forest land was 3.5 billion board feet or 201 board feet per acre per year (table 11). Douglas-fir and the true firs each accounted for 27 percent of the net growth; ponderosa and Jeffrey pine combined accounted for 19 percent; redwood, 14 percent.

An average of 2.25 billion board feet of sawtimber volume was lost annually to fire, insects, disease, windthrow, and other destructive agents of natural mortality during the 10-year period (table 12). The average annual net volume per acre mortality for the period was 129 board feet per acre.

Annual Cut

More than 99 percent of the sawtimber cut from commercial forests in California in 1962 was softwood. Of the 5.7 billion board feet removed from growing stock in logging, all but 461 million board feet were used for wood products; the remainder was left as logging residues (table 13). Douglas-fir accounted for 41 percent of the cut; redwood, ponderosa and Jeffrey pine and the true firs, accounted for 18, 15, and 15 percent, respectively (table 14). Hardwoods accounted for less than 1 percent of the timber cut in 1962. They contributed about the same percentage of the total inventory and total growth.

The annual cut figures presented in this report differ slightly from those reported in the Forest Service report "Timber Trends in the United States,"⁵ which were based upon Bureau of Census production reports.

⁵See footnote 2.

Appendix

Tables

Table 1.--*Land area, by major classes of land, California, 1963*

Class of land	Area
	<i>Thousand acres</i>
Forest:	
Commercial	17,391
Noncommercial	
Productive--reserved	1,194
Unproductive	23,956
Total forest	42,541
Non-forest	¹ /57,666
Total, all classes	100,207

¹Includes 83,000 acres of water according to Survey standards of area classification but defined by the Bureau of Census as land.

Table 2.--*Commercial forest land area, by ownership classes, California, 1963¹*

Ownership class	Area
	<i>Thousand acres</i>
Federal:	
National Forest	8,656
Bureau of Land Management	326
Indian	110
Other	40
Total	9,132
State	91
County and municipal	8
Total	99
Private:	
Forest industry	2,987
Farm	1,609
Other private	3,564
Total	8,160
Total, all ownership	17,391

¹Ownership breakdowns revised based upon information unavailable for "Timber Trends in the United States." U.S. Dep. Agr., Forest Serv. Forest Resource Rep. 17. 1965.

Table 3.--Commercial forest land area, by stand-size classes,
California, 1963

Stand-size class	Area
	<i>Thousand acres</i>
Sawtimber stands:	
Old growth	8,703
Young growth	4,095
Total	12,798
Poletimber stands	763
Sapling and seedling stands	76
Nonstocked areas	3,754
Total, all classes	17,391

Table 4.--Commercial forest land area, by stocking classes of growing-stock
trees and by stand-size classes, California, 1963

Stocking class	All stands	Saw-timber stands	Pole-timber stands	Sapling and seedling stands	Non-stocked stands
	<i>Thousand acres</i>				
Well-stocked	4,980	4,810	169	1	--
Medium-stocked	5,290	5,006	281	3	--
Poorly-stocked	3,367	2,982	313	72	--
Non-stocked	3,754	--	--	--	3,754
Total, all classes	17,391	12,798	763	76	3,754

Table 5.--Commercial forest land area, by major forest types¹
and ownership groups, California, 1963

Type	All ownerships	Public ownerships	Private ownerships
	<i>Thousand acres</i>		
Softwoods:			
Douglas-fir	4,402	2,315	2,087
Hemlock--sitka spruce	6	1	5
Redwood	1,586	130	1,456
Ponderosa pine	6,069	3,517	2,552
White pine (sugar pine)	2,254	1,352	902
Lodgepole pine	301	227	74
Fir--spruce	2,753	1,791	962
Hardwoods	20	14	6
Total, all types	17,391	9,347	8,044

¹The forest types presented in this table conform with standard types as defined by Forest Survey.

Table 6.--Commercial forest land area, by yield class,
California, 1963

Yield class ¹	Area
	<i>Thousand acres</i>
120 cubic feet or more	5,686
85 to 120 cubic feet	4,665
50 to 85 cubic feet	6,270
Less than 50 cubic feet	770
Total, all classes	17,391

¹Based on potential yields in cubic feet per acre of mean annual growth at culmination of increment in fully stocked stands.

Table 7.--Volume of timber on commercial forest land, by class of timber
and species group, California, 1963

Class of timber	All species	Softwoods	Hardwoods
	<i>Million cubic feet</i>		
Sawtimber trees:			
Sawlog portion	43,656	43,530	126
Upper-stem portion	6,469	6,469	0
Total	50,125	49,999	126
Poletimber trees	5,173	4,862	311
All growing-stock trees	55,298	54,861	437
Sound cull trees:			
Sawtimber-size trees	693	50	643
Poletimber-size trees	30	11	19
Total	723	61	662
Rotten cull trees:			
Sawtimber-size trees	913	737	176
Poletimber-size trees	41	11	30
Total	954	748	206
Salvable dead trees:			
Sawtimber-size trees	199	199	0
Poletimber-size trees	0	0	0
Total	199	199	0
Total, all timber	¹ /57,174	55,869	1,305

¹Estimates of additional volumes on unproductive forest land total 5,401 million cubic feet in trees 5.0 inches and larger d.b.h., including 2,786 million cubic feet of softwoods and 2,615 million cubic feet of hardwoods.

Table 8.--Volume of growing-stock and sawtimber on commercial forest land,
by ownership classes and species group, California, 1963

GROWING-STOCK			
Ownership class	All species	Softwoods	Hardwoods
	<i>Million cubic feet</i>		
National forest	29,163	28,905	258
Other public	2,145	2,128	17
Forest industry	8,960	8,900	60
Farmer and misc. private	15,030	14,928	102
Total, all ownership	55,298	54,861	437

SAWTIMBER			
	<i>Million board feet¹</i>		
National forest	162,103	161,200	903
Other public	11,631	11,563	68
Forest industry	48,664	48,423	241
Farmer and misc. private	81,514	81,112	402
Total, all ownership	303,912	302,298	1,614

¹International 1/4-inch log rule.

Table 9.--Volume of growing-stock and sawtimber on commercial forest land,
by species, California, 1963

Species	Growing-stock	Sawtimber
	<i>Million cubic feet</i>	<i>Million board feet¹</i>
Softwoods:		
Douglas-fir	17,761	98,973
Ponderosa pine ²	10,496	58,398
Sugar pine ³	4,112	25,031
True firs	13,804	75,303
Redwood	5,502	30,981
Other softwoods	3,186	13,612
Total	54,861	302,298
Hardwoods	437	1,614
Total, all species	55,298	303,912

¹International 1/4-inch log rule.

²Includes Jeffrey pine.

³Includes Western white pine.

Table 10.--Volume of growing-stock and sawtimber on commercial forest land, by diameter class and species group, California, 1963

GROWING-STOCK						
Species group	All classes	Diameter class (inches)				
		5.0-10.9	11.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
	Million cubic feet					
Softwoods	54,861	4,862	9,383	12,340	11,556	16,720
Hardwoods	437	311	52	50	20	4
Total ¹ , all species	55,298	5,173	9,435	12,390	11,576	16,724
SAWTIMBER						
	Million board feet ¹					
Softwoods	302,298	--	31,433	73,167	79,035	118,663
Hardwoods	1,614	--	617	651	268	78
Total, all species	303,912	--	32,050	73,818	79,303	118,741

¹International 1/4-inch log rule.

Table 11.--Average annual net growth of growing-stock and sawtimber on commercial forest land, by species, California, 1962

Species	Net annual growth	
	Thousand cubic feet	Thousand board feet ¹
Softwoods:		
Douglas-fir	172,484	954,560
Ponderosa pine ²	116,666	663,947
Sugar pine ³	38,330	251,070
True firs	180,869	945,221
Redwood	92,231	480,313
Other softwoods	43,122	207,770
Total	643,702	3,502,881
Hardwoods	6,903	23,919
Total, all species	650,605	3,526,800

¹International 1/4-inch log rule.

²Includes Jeffrey pine.

³Includes Western white pine.

Table 12.--*Annual mortality of growing-stock and sawtimber on commercial forest land, by causes and species group, California, 1962*¹

GROWING-STOCK			
Cause of death	All species	Softwoods	Hardwoods
	<i>Thousand cubic feet</i>		
Fire	92,821	91,173	1,648
Insects	53,865	53,865	0
Disease	84,766	84,640	126
Other	183,656	181,196	2,460
Total, all causes	415,108	410,874	4,234

SAWTIMBER			
	<i>Thousand board feet</i> ²		
Fire	516,111	510,283	5,828
Insects	355,164	355,164	0
Disease	453,061	452,616	445
Other	925,882	917,079	8,803
Total, all causes	2,250,218	2,235,142	15,076

¹Mortality figures represent average annual losses over a ten to fifteen year period, rather than actual mortality for 1962.

²International 1/4-inch log rule.

Table 13.--*Timber cut from growing stock and sawtimber on commercial forest lands, by products, California, 1962*

Products	Growing stock	Sawtimber
	<i>Thousand cubic feet</i>	<i>Thousand board feet</i> ¹
Roundwood products:		
Sawlogs	652,489	4,502,177
Veneer logs and bolts	93,636	720,995
Cooperage logs and bolts	0	0
Pulpwood	517	2,956
Piling	406	2,031
Poles	2,114	9,643
Mine timber	246	1,061
Misc. industrial wood	1,912	15,681
Posts	359	2,925
Fuelwood	2,510	9,645
All products	754,189	5,267,114
Logging residues	163,791	460,728
Timber cut	917,980	5,727,842

¹International 1/4-inch log rule.

Table 14.--Annual cut of growing-stock and sawtimber on commercial forest land, by species, California, 1962

Species	Growing-stock	Sawtimber
	Thousand cubic feet	Thousand board feet ¹
Softwoods:		
Douglas-fir	366,790	2,342,659
Ponderosa pine ²	140,826	878,029
Sugar pine ³	64,697	402,628
True firs	138,493	868,460
Redwood	166,297	1,034,858
Other softwoods	27,186	168,621
Total	904,289	5,695,255
Hardwoods	13,691	32,587
Total, all species	917,980	5,727,842

¹International 1/4-inch log rule.

²Includes Jeffrey pine.

³Includes Western white pine.

Accuracy

Data presented in this report were developed by sampling procedures. In varying degree, all the data are subject to the possibility of error. Errors could have been introduced through mistakes in classifying, measuring, tabulating, or reporting; through faulty judgment; or through the use of sampling procedures. Errors may or may not be compensating. Except for sampling error, there is no way of measuring them, but the chances of human error were reduced as far as possible by following detailed plans, by intensive training of personnel, and by careful supervision and checking of the work.

Sampling error accounts for errors that arise from taking a sample rather than making a complete inventory or measurement; it does not include possible errors resulting from human mistakes or faulty judgment. The sampling error of an estimate is given here in terms of one standard error, i. e., the range about the estimate within which the odds are two to one that the value based on 100 percent coverage would fall.

Analysis of the California forest inventory data indicates a sampling error of ± 0.6 percent for the estimate of total commercial forest land area, 1.7 percent for total cubic volume of growing stock, and 7.2 percent for total volume of net growth in cubic feet.

As area or volume data are subdivided by forest type, species, ownership, or other breakdown, the possibility of error increases and is greatest for the smallest item. The order of the increase is indicated in the following tabulation of sampling errors...

For commercial forest area:

<u>Area</u> (thousand acres)	<u>Sampling error</u> (percent)
17,391	0.6
5,000	1.1
1,000	2.6
100	8.1

For inventory volume:

<u>Growing stock</u> (million cu.ft.)	<u>Sampling error</u> (percent)
55,298	1.7
30,000	2.3
1,000	12.6
100	40.0

For average net annual growth of growing stock:

<u>Volume</u> (million cu.ft.)	<u>Sampling error</u> (percent)
651	7.2
200	13.0
50	26.0
5	82.1

Comparison with 1953 Inventory

The 1963 re-inventory shows more commercial forest land and less timber volume than in the 1953 survey. Part of the difference reflects actual physical change of the resource. Part is attributed to changes in procedures and definitions used in the inventories. And the remainder is due to sampling error. Consequently some statistics from the two inventories are not directly comparable.

Commercial Forest Land

Reported commercial forest land area increased from 17,317,000 acres (1953) to 17,391,000 acres (1963). This increase of 0.4 percent reflects an increase in the estimate of commercial forest land in southern California based upon a reclassification of forested areas there. For the remainder of the State, additions to commercial forest area through reforestation and reclassifications were offset by withdrawals for dams, rights-of-way, and other developments, resulting in negligible net change during the period.

Sawtimber Volume

Sawtimber volume is down from 360 billion board feet in 1953 to 304 billion board feet in 1963. Much of the difference represents an actual reduction in inventory, as to be expected in a region where large amounts of old-growth timber contribute little net growth but support a large annual cut.

Imbalance between growth and annual cut accounts for about half the difference between inventories. Some of the difference is due primarily to changes in standards of utilization, in procedures, and in definitions. Additionally, in 1962, field crews identified many cull indicators that had been overlooked in the 1953 inventory. The result is a drop in net volumes. Finally, sampling errors associated with the two inventories account for some of the difference between inventories.

Growth and Mortality

Average net annual growth increased from 2.9 billion board feet for the period preceding 1953 to 3.5 billion board feet for the period 1953 through 1962. This increase reflects the continued change in stand structures as old-growth stands with little or no net growth are cut, and as second-growth stands reach sawtimber size.

Average annual mortality for the 10-year period was 2.25 billion board feet, or 20 percent greater than the 1.87 billion board feet reported in the 1953 inventory.

Procedures

Initial Survey

The initial survey for California was completed in 1952. The survey was based upon aerial photo delineation of the State's forested areas into several strata, transfer of the stratified areas to base maps from which area information was derived, and establishment of more than 1,500 field plots within the various strata to estimate volume.

Re-inventory

In 1962, Forest Survey field crews remeasured a sample of the initial survey field plots. Information on diameter increment, ingrowth, distribution of cut by diameter, mortality, and present volume was derived from these plots.

Volume

The January 1, 1963 estimates of volume are based on regression relationships developed from past and present volumes on the remeasured field plots, as applied to all of the initial survey field plots.

Commercial Forest Area

Area estimates of commercial forest land are based on the initial photo-delineation adjusted for changes in land classification during the past 10-years. This procedure was used for most of the State. For southern California, however, the estimate of commercial forest land area is based upon a re-evaluation, by photo point inspection on recent photography, and subsequent field checks.

Growth and Mortality

Growth estimates are based on the diameter increment of trees remeasured on the sample field plots. Estimates of mortality are based on trees that died during the interval between measurements.

Timber Cut

Timber cut estimates were derived by applying wood residue factors to the volume of roundwood harvested from California's forest lands in 1962. The roundwood harvest estimate was based upon a survey of all known users of roundwood material.

Definition of Terms

Commercial forest land: Forest land that is producing or capable of producing crops of industrial wood and is not withdrawn from timber use by statute or administrative regulation; includes areas suitable for management to grow crops of industrial wood and generally capable of producing in excess of 25 cubic feet per acre of annual growth; includes both accessible and prospectively accessible areas and both operable and prospectively operable areas.

Commercial species: Tree species now or prospectively suitable for industrial wood products; excludes so-called weed species.

Cull trees: Live trees that do not contain at least one merchantable sawlog, now or prospectively, because of roughness, rot, or species (also see sound cull trees and rotten cull trees).

Diameter classes: A classification of trees based on diameter of the tree outside bark, measured at breast height (4-1/2 feet above the ground). D.b.h. is the common abbreviation for "diameter at breast height."

Farmer-owned lands: Lands owned by operators of farms.

Forest industry lands: Lands owned by companies or individuals operating wood-using plants.

Forest land: Land at least 10 percent stocked by forest trees of any size, or formerly having had such tree cover and not now developed for non-forest use; includes chaparral areas in the West and afforested areas. The minimum area for classification of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width at least 120 feet wide to qualify as forest land. Unimproved roads and trails, streams, and clearings in forest areas are classed as forest if less than 120 feet in width. (See also commercial forest land, noncommercial forest land, productive-reserved forest land, and unproductive forest land.)

Forest types: A classification of forest land based upon the tree species now forming most of stocking. Where no species comprises a majority of a stand, types are based on plurality of stocking, excepting in the case of redwood and sugar pine in which the basis is that 20 percent or more of the stand be composed of the key species.

Growing-stock trees: Live sawtimber trees, poletimber trees, saplings, and seedlings of commercial species meeting specified standards of quality or vigor that are now or may be expected to become suitable for use as industrial wood; excludes cull trees.

Indian lands: Tribal lands held in fee by the Federal Government but administered for Indian tribal groups and Indian trust allotments.

Industrial wood: All commercial roundwood products, such as sawlogs and pulpwood, but excluding fuelwood and posts.

Land area: (a) Census definition--the area of dry land and land temporarily or partially covered by water, such as marshes, swamps, and river flood plains (omitting tidal flats below mean high tide); streams, sloughs, estuaries, and canals less than one-eighth of a statute mile in width; and lakes, reservoirs, and ponds less than 40 acres in area. (b) Forest Survey definition--same as above except maximum width of streams, etc., is 120 feet and maximum size of lakes, etc., is 1 acre.

Logging residues: The unused portions of poletimber and sawtimber trees cut or killed by harvesting timber, land clearing, or cultural operations.

Miscellaneous Federal lands: Federal lands other than National Forests, lands administered by the Bureau of Land Management, and Indian lands.

Miscellaneous private lands: Privately owned lands other than forest industry or farmer-owned lands.

Mortality: The volume of sound wood in live sawtimber and poletimber trees (growing-stock trees) dying from natural causes during a specified period.

National Forest land: Federal lands that have been designated by Executive Order or statute as National Forests or purchase units, and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones Title III lands.

Net annual growth: The average annual change in volume of sound wood in live sawtimber and poletimber trees resulting from natural causes, i. e., increase in volume in absence of mortality and cutting, minus mortality, plus growth on mortality and growth on one-half the cut during a specified period.

Net volume: Gross volume less deductions for defects, excluding cull trees--

Growing stock: Gross cubic-foot volume less deductions for rot and missing sections.

Sawtimber: Gross board-foot volume less deductions for rot, sweep, crook, missing sections, and other defects that affect use for lumber.

Noncommercial forest land: Unproductive forest land incapable of yielding crops of industrial wood because of adverse site conditions, and productive forest land withdrawn from commercial timber use through statute or administrative regulation.

Nonforest land: Land that has never supported forests and lands formerly forested but now developed for such nonforest uses as crops, improved pasture, residential areas, and city parks, improved roads, and adjoining rights-of-way, powerline clearings, and certain areas of water classified by the Bureau of the Census as land (see definition of land area). In forest areas, unimproved roads, streams, canals, and nonforest strips must be more than 120 feet wide; and clearings in forest areas must be more than 1 acre in size, to qualify as nonforest land.

Nonstocked areas: Commercial forest land less than 10 percent stocked with growing-stock trees.

Old-growth sawtimber stands: Sawtimber stands in which 50 percent or more of the net board-foot volume is in old-growth sawtimber trees.

Old-growth sawtimber trees: Trees that have reached or passed the age of physiological maturity.

Ownership: The property owned by one owner, including all parcels of land in the United States.

Poletimber stands: Stands at least 10 percent stocked with growing-stock trees, and with poletimber trees making up a plurality of this stocking.

Poletimber trees: Live trees of commercial species 5.0 to 10.9 inches in diameter at breast height, and of good form and vigor.

Productive-reserved forest land: Productive public forest land withdrawn from timber use through statute or administrative regulation.

Rotten cull trees: Live trees of commercial species, 5.0 inches and larger in diameter at breast height, that do not contain at least one minimum sawlog, now or prospectively, and have less than 25 percent of their volume in sound wood primarily because of rot (e. g., when rot accounts for 50 percent or more of the total cull volume).

Rough trees (sound cull trees): Live trees, 5.0 inches or larger in diameter at breast height, that do not contain at least one minimum sawlog, now or prospectively, and have less than 25 percent of their volume in usable form primarily because of roughness, poor form, or noncommercial species.

Roundwood products: Logs, bolts, or other round sections cut from trees.

Salvable dead trees: Standing or down dead trees, 11.0 inches or more in diameter at breast height, that contain at least one merchantable sawlog

and 25 percent or more of sound wood volume.

Saplings: Live trees of commercial species, 1.0 to 5.0 inches in diameter at breast height and of good form and vigor.

Sapling-seedling stands: Stands at least 10 percent stocked with growing-stock trees and with saplings or seedlings or both making up a plurality of this stocking.

Sawlog: A log meeting minimum approved log-grade specifications; or, for species for which approved log grades are lacking, a log at least 10 feet long, with a minimum d.i.b. of 10 inches, and with a net scale of at least 30 board feet.

Sawlog portion: That part of the bole of sawtimber trees between the stump and the sawlog top.

Sawtimber stands: Stands at least 10 percent stocked with growing-stock trees, and with sawtimber trees making up a plurality of this stocking.

Sawtimber trees: Live trees, 11.0 inches or larger in diameter at breast height, containing at least one minimum sawlog.

Seedlings: Established live trees of commercial species, less than 1.0 inch in diameter at breast height and of good form and vigor.

Stand-size classes: A classification of forest land based on the predominant size of timber present, that is, sawtimber, poletimber, saplings, and seedlings.

State, county, and municipal lands: Lands owned by States, counties, and local public agencies, or lands leased by these governmental units for more than 50 years.

Stocking: A measure of the degree to which area is occupied or used by trees of specified classes, including (a) all live trees, (b) growing-stock trees, and (c) desirable trees. Classification of forest land and forest types is based on stocking of all live trees. Stocking of growing-stock trees is used to determine stand-size and age class.

Stocking standards: The minimum number of well-spaced trees required to use fully the area by specified forest types and sites.

Timber cut from growing stock: The volume of sound wood in live sawtimber and poletimber trees cut for forest products during a specified period, including both roundwood products and logging residues.

Timber cut from sawtimber: The net board-foot volume of live sawtimber trees cut for forest products during a specified period, including both roundwood products and logging residues.

Timber products: Roundwood products and byproducts of primary wood manufacturing plants; includes sawlogs, veneer logs and bolts, cooperage logs and bolts, pulpwood, fuelwood, piling, poles, posts, hewn ties, mine timbers, and other round, split, or hewn products.

Tree-size classes: A classification of growing-stock trees according to diameter at breast height outside bark, including sawtimber trees, poletimber trees, saplings, and seedlings.

Unproductive forest land: Forest land incapable of yielding crops of industrial wood because of adverse site conditions; includes sterile or poorly drained forest land, subalpine forests, and steep, rocky areas where topographic conditions are likely to prevent management for timber production.

Upper-stem portion: That part of the bole of sawtimber trees above the merchantable top to a minimum top diameter of 4.0 inches outside bark, or to the point where the central stem breaks into limbs.

Volume of growing stock: The cubic-foot volume of sound wood in the bole of noncull sawtimber and poletimber trees of commercial species from a 1-foot stump to a minimum 4.0-inch top outside bark or to the point where the central stem breaks into limbs.

Volume of salvable dead sawtimber-size trees: Net volume of dead sawtimber-size trees, standing or down, that are considered merchantable

by regional standards.

Volume of sawtimber: Net volume of the sawlog portion of live sawtimber trees in board feet (International 1/4-inch log rule).

Yield classes: A classification of forest land in terms of inherent capacity to grow crops of industrial wood.

Young-growth sawtimber stands: Sawtimber stands in which 50 percent or more of the net board foot volume is in young-growth sawtimber trees.

Young-growth sawtimber trees: Trees that have not passed the age of physiological maturity.

Tree Species

Principal tree species found on the commercial forest land in California include:

SOFTWOODS

Common name	Scientific name
Redwood	<i>Sequoia sempervirens</i> (D. Don) Endl.
Douglas-fir	<i>Pseudotsuga menziesii</i> (Mirb.) Franco
Ponderosa pine	<i>Pinus ponderosa</i> Laws.
Jeffrey pine	<i>Pinus jeffreyi</i> Grev. & Balf.
Sugar pine	<i>Pinus lambertiana</i> Dougl.
Western white pine	<i>Pinus monticola</i> Dougl.
California red fir	<i>Abies magnifica</i> A. Murr.
White fir	<i>Abies concolor</i> (Gord. & Glend.) Lindl.
Grand fir	<i>Abies grandis</i> (Dougl.) Lindl.
Incense-cedar	<i>Libocedrus decurrens</i> Torr.
Port-Orford-cedar	<i>Chamaecyparis lawsoniana</i> (A. Murr.) Parl.
Sitka spruce	<i>Picea sitchensis</i> (Bong.) Carr.
Western hemlock	<i>Tsuga heterophylla</i> (Raf.) Sarg.
Mountain hemlock	<i>Tsuga mertensiana</i> (Bong.) Carr.
Western redcedar	<i>Thuja plicata</i> Donn.
Lodgepole pine	<i>Pinus contorta</i> Dougl.

HARDWOODS

California black oak	<i>Quercus kelloggii</i> Newb.
Tanoak	<i>Lithocarpus densiflorus</i> (Hook. & Arn.) Rehd.
Quaking aspen	<i>Populus tremuloides</i> Michx.
Alder (white alder)	<i>Alnus rhombifolia</i> Nutt.
Alder (red alder)	<i>Alnus rubra</i> Bong.



